MEMO

State of Idaho
Department of Water Resources
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Date: April 6, 2015

To: Gary Spackman, P. E., Director

From: Tim Luke, Water Compliance Bureau

Subject: Updated Staff Memorandum regarding IGWA's 3rd Mitigation Plan: SPF Water Engineering's Proposed Flow Measurements at Sandy Ponds and Aquifer Recharge Measurement (60% Submittal)

On February 17, 2015, I submitted a memorandum to you regarding staff comments on measurements and methodology for aquifer recharge at Sandy Ponds proposed by IGWA.

On February 26, 2015, Bob Hardgrove, SPF Water Engineering ("SPF"), submitted to IDWR a memorandum in response to the IDWR staff memorandum of February 17, 2015. A copy of the SPF February 26th memo is attached. SPF agreed with most of the comments and suggestions included in the IDWR February 17th memo. On March 6, 2015, representatives of IDWR (Tim Luke and Cindy Yenter), met with Bob Hardgrove and Peter Cooper of SPF; Dr. Charles Brockway, Sr., representing Rangen, Inc.; and Frank Erwin, Water District 36A watermaster, to discuss some remaining questions and concerns regarding aquifer recharge measurements and procedures.

This memo outlines the current understanding between IDWR and SPF regarding IGWA's proposed plans for measuring aquifer recharge at the Sandy Ponds. IDWR staff concludes that so long as IGWA's measurements and procedures are consistent with this memo, IDWR should be able to determine the amount of aquifer recharge at the Sandy Ponds.

1. Water Balance Equation for Recharge Calculation

IDWR and SPF agree with the water balance equation described in the original SPF Memo for recharge volume calculation. IGWA shall be responsible for compiling all necessary data in computing the recharge water balance equation. IDWR understands that Dr. Brockway also agreed with use of the water balance equation.

2. Measurement of Inflows to Sandy Ponds

IDWR and SPF agree that the NSCC weir to measure inflow to Sandy Ponds can be used provided that certain improvements are made to the weir. SPF agrees that the existing check

structure and weir blade must be rehabilitated to meet published weir standards. IDWR agrees that the weir approach velocities are acceptable. SPF acknowledges that the weir structure functions as a check to a small head gate just upstream of the weir but the current weir height is adequate to maintain flows to the head gate, as long as the Veenstra delivery ditch is properly maintained.

Now that water is flowing in the W-26 canal, it will be difficult to perform any improvements to the existing weir. Inflow measurements for the 2015 irrigation season may need to rely on the existing NSCC weir and measurement system.

SPF will collect additional data regarding the existing structure in 2015 and continue to negotiate with NSCC to determine the best path forward for future irrigation seasons. Currently the two proposed options are:

1. Improve the existing check/weir structure to meet published weir standards. Clean the Veenstra ditch so their flows can be obtained with the height of the weir and without additional checkboards. Utilize NSCC measuring instruments to log flows.
2. Install a new weir downstream of the existing. Relocate NSCC's measuring instruments to the new structure to log flows.

IDWR may accept either option above but favors option 2 as that option should remove all concerns relative to water measurement accuracy and potential impact on the upstream Veenstra diversion. IDWR understands that Dr. Brockway recognizes that the existing structure could be made to meet standard weir criteria but prefers a new weir or flume downstream that would likely be installed after the 2015 irrigations season. SPF will update IDWR regarding plans to install a separate measuring device or continue with the upgraded structure after the 2015 irrigation season.

Measurement of Pond 1 Outflows

Based on discussion between SPF, IDWR and Dr. Brockway, and upon a recent site visit by SPF, SPF proposes that IGWA will install and maintain a standard weir downstream of the Butch Morris irrigation pump located on the channel downstream of Pond 1. The weir will be located on the outlet of a small pond within the channel. The weir structure will have a fixed height and also serve as a check structure for the pond and irrigation pump. The weir will measure any spill past the pond. Spill past the weir plus the Morris irrigation pump diversion shall count as Pond 1 outflow. An 8-inch Seametrics AG2000 flow meter has been installed with an AC power supply on the Morris irrigation pump since the water right for the pump requires a measuring device. A staff gage, transducer and recording equipment/data logger will be installed to measure flows spilling over or through the future weir structure.

IDWR approves of the SPF proposal to install and locate a standard weir on the outlet of the small diversion pond in the channel below Pond 1 as described above. SPF will send final weir

design and specifications to IDWR. IDWR understands that Dr. Brockway agrees with this proposal.

Pond 2 Outflows to Sandy Pipe

SPF and IDWR discussed several options for measuring discharge to the Sandy Pipeline from Pond 2. IDWR advised SPF that the irrigation pumps from the Sandy Pipeline Vault need to be measured separately. Given that information, SPF advised that they may continue with installation of a weir on the existing baffle wall or a new baffle wall in the vault to measure discharge from the vault to the Curren Ditch. The measured flows over the weir plus the flow meters would equal the total flow discharged from the Sand Ponds in the Sandy Pipe. Alternatively or additionally, they may install the originally proposed flow meter in the 36-inch Sandy Pipeline or a new weir in a similar vault structure at the head of the pipeline downstream from Pond 2 as described in the January 9th supplemental memo. Final plans for devices to measure Pond 2 discharge to the pipeline may depend on additional IGWA deliveries of mitigation water to the Curren Ditch pending ongoing negations between IGWA, Hagerman area water users, and the State.

IDWR still has concerns with any plan for installation of a suppressed weir on the existing baffle wall in the Sandy Vault due to potential velocity approach conditions, but will further evaluate the installation if it can be shown approach conditions are not an issue.

IDWR does not object to installation of a standard weir, other open channel measuring device, or ultrasonic flow meter at the head of the pipeline at the outlet of Pond 2. IDWR will evaluate any updated measurement plans or proposals from SPF/IGWA. IDWR understands that SPF will submit to IDWR detailed plans or measuring device specifications prior to installing any device or devices to measure Pond 2 discharge. IDWR understands that Dr. Brockway concurs with IDWR's decision regarding the need to measure the individual irrigation pumps from the Sandy Vault. Dr. Brockway also shares concerns with IDWR about the adequacy of a suppressed weir on the baffle wall of the Sandy Vault, stating that "the approach conditions will not be standard weir geometry and accuracy of the weir measurement will be in question because of velocity of approach conditions." IDWR understands that typical flows in the pipeline may less than perceived by staff based on observations from prior years, thereby reducing some concerns about approach velocity. It is not yet clear what the typical future flows will be in the pipeline. SPF shall copy Dr. Brockway with any updated plans or specifications.

Pond Evaporation

IDWR, SPF and Dr. Brockway concur with the approach proposed by SPF in prior memos, which is to use mean monthly evapotranspiration ("ET") data in daily pond evaporation calculations completed by IGWA, but IDWR may choose to use actual daily ET data available from the nearest local Agrimet station in any post-audit review of recharge calculations.

Discharge to Martin-Curren Ditch Data Collection Plan

IDWR and SPF agree that measurement of discharge to the Martin-Curren Ditch is not necessary in order to calculate aquifer recharge from the Sandy Ponds. However, IDWR and SPF/IGWA agree that measurement of any discharge to the ditch may be necessary in the future depending on negotiations between IGWA, Hagerman area water users, and the State regarding additional mitigation activities that may involve regular deliveries to the Curren Ditch through the Sandy Pipeline. Measurement devices on the individual pumps from the Sandy Vault coupled with one of the options described above for measurement of Pond 2 outflow will provide sufficient information to calculate discharge to the Martin-Curren Ditch.

Final Design and IDWR Review

As proposed by SPF's memo of February 26, 2015, IDWR and SPF agree that SPF will continue to work with IDWR as final design of measuring devices move forward, and that IDWR will review final designs prior to any construction or installation.

IGWA's mitigation plan is currently under review by the Director. If the Director approves the mitigation plan, mitigation credit for aquifer recharge will be dependent on getting approved measurement devices installed at the locations described in this memo. As of the date of this memo, several measuring devices have not yet been installed, including the weir on the Pond 1 out flow and, the Pond 2 outflow measuring device. Additionally, the NSCC weir for measuring inflows has not yet been rehabilitated.

Ownership and O&M

IDWR and SPF agree that all measuring devices and related monitoring, recording and telemetry equipment should be owned, operated and maintained by IGWA. IDWR understands that SPF or IGWA may use monitoring, recording and/or telemetry equipment that is different from what IDWR normally uses for monitoring, recording and telemetry purposes. SPF/IGWA shall continue to maintain measuring devices approved by IDWR.

Annual Reporting; Watermaster Access

IDWR and SPF agree that consultants for IGWA be responsible for reporting and calculating aquifer recharge estimates. The IGWA consultants will provide data supporting the calculations and estimates, including mean daily measurement data from specific measurement sites used in the calculations. IDWR staff should be responsible for reviewing water balance equations and computations supporting aquifer recharge estimates.

IDWR and SPF/IGWA agree that the WD36A watermaster shall have access to measurement sites to make periodic measurements or observations using installed measuring devices.